

LETTER
FROM
THE SECRETARY OF WAR,
TRANSMITTING

Report of Board of Engineers in relation to bridge over Detroit River, &c.

DECEMBER 8, 1879.—Referred to the Committee on Commerce and ordered to be printed.

WAR DEPARTMENT,
Washington City, December 6, 1879.

The Secretary of War has the honor to transmit to the United States Senate copy of report of a Board of Engineer officers made in compliance with the requirements of joint resolution of Congress approved June 30, 1879, relating to a bridge across the Detroit River at or near Detroit, Mich.

GEO. W. McCRARY,
Secretary of War.

The PRESIDENT OF THE UNITED STATES SENATE.

OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., December 3, 1879.

SIR: I have the honor herewith to submit a report from the Board of Engineer officers constituted by Par. I, Special Orders No. 213, Headquarters of the Army, Adjutant-General's Office, dated September 15, 1879, made in compliance with the "Joint resolution relating to a bridge across the Detroit River at or near Detroit, Mich.," approved June 20, 1879.

Very respectfully, your obedient servant,

JOHN G. PARKE,
Acting Chief of Engineers.

Hon. GEO. W. McCRARY,
Secretary of War.

REPORT OF THE BOARD OF ENGINEERS.

DETROIT, MICH., November 21, 1879.

To the CHIEF OF ENGINEERS,
Washington, D. C. :

GENERAL: The board directed to be organized by the joint resolution of Congress, to wit:

Whereas recent progress in the art has shown the practicability of constructing bridges having spans of 500 feet, or possibly more: Therefore,

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of War is hereby authorized and required to convene a Board of Engineers of the Army, whose duty it shall be to inquire into and report whether, for railroad purposes, the river Detroit can be bridged or tunneled at the city of Detroit, or within one mile above or below said city, in such manner as to accommodate the large trade and commerce crossing the river at that point and without material or undue injury to the navigation of said river, a good and sufficient tug being always kept by bridge owners to assist any craft when required.

convened at Detroit, Mich., on the 14th of October, 1879, by virtue of the following order:

S. O. No. 213]

HEADQUARTERS OF THE ARMY,
ADJUTANT-GENERAL'S OFFICE,
Washington, September 15, 1879.

1. The following order has been received from the Secretary of War:

In pursuance of a joint resolution of Congress approved June 20, 1879, published in General Orders No. 67, July 3, 1879, from this office, entitled "Joint resolution relating to a bridge across the Detroit River at or near Detroit, Mich.," a Board of Engineer officers, to consist of Lieut. Col. W. F. Reynolds, Lieut. Col. Nathaniel Michler, Maj. O. M. Poe, Maj. D. C. Houston, Maj. J. M. Wilson, will convene at the city of Detroit, Mich., upon the call of the senior officer, and at as early a day as practicable consistent with the other duties of the members.

The board will be governed by the requirements of the act mentioned, and will make its report and recommendations to the Chief of Engineers before the 1st of December next.

The junior member will act as recorder.

By command of General Sherman.

E. D. TOWNSEND,
Adjutant-General.

The board remained in session five days, during which time it was engaged in hearing statements and arguments of persons favoring and opposing the construction of a bridge or tunnel across the Detroit River, the substance of which is given in the record of proceedings appended to this report.

At the urgent request of all parties interested, the board adjourned to enable them to collect statistics bearing upon the subject.

The board reassembled on the 18th of November, and after hearing further statements and arguments as specified in the record, proceeded to consider the matters referred to it.

At Detroit two immense streams of commerce come into direct interference, namely, one by water and the other by railroads. The problem before the board was to so arrange, by either bridge or tunnel, that these might cross each other with the least injury to both, and in such a manner as to accommodate the railroad traffic, and at the same time do no material or undue injury to the interests of navigation.

The question of bridging the channel-way between Lake Huron and Lake Erie was discussed by a Board of Engineer officers in 1873, and that board made an elaborate and exhaustive report, which is published with the Report of the Chief of Engineers for 1874, vol. 1, page 587.

The locality defined by the joint resolution of Congress is within the

limits covered by the report of the board referred to, and extends from about the middle of Belle Isle, above the city of Detroit, to or near Fort Wayne, below it a distance of a little more than 6 miles. The channel from the foot of Belle Isle to the lower limit of the city is straight, running about twenty-five degrees south of west, and then changes twenty degrees more to the southward.

The width of the channel on either side of Belle Isle is about 2,000 feet, its greatest depth on the northerly side being from 25 to 30 feet, and on the southerly from 30 to 40. Below Belle Isle the greatest depth varies from 39 to about 50 feet.

The question of bridging or tunneling the river near Detroit has been agitated for several years, and numerous plans and projects therefor have been proposed; several of these have been presented for consideration, but as the joint resolution of Congress, embodying the only instructions the board has received, does not require a discussion of modes, plans of construction, details of operation, or the matter of cost, these subjects, in a general way, are not referred to in this report.

The magnitude of the conflicting interests at this point may be realized from the official statement that the number of vessels of various kinds passing Fort Gratiot light-house during the fiscal year ending June 30, 1879, was 22,150. The business of the railroads crossing the river at Detroit during the year 1878 was as follows, viz:

129,113 passengers.

12,258 passenger-cars.

3,873 baggage-cars.

104,359 freight-cars.

The joint resolution contemplates two modes of crossing; first, by a bridge; second, by a tunnel.

BRIDGE.

The conclusions to which the board of 1873 arrived are as follows, viz:

1st. That a bridge giving a clear headway of 150 feet, and clear spans of 400 feet, would not seriously injure navigation, but would be very expensive, involving long, and in some places inconvenient approaches.

2d. That no bridge giving passage to vessels by draws alone, with draw-spans at present practicable, can be permitted without serious injury to navigation.

3d. That a bridge giving a clear opening of 700 feet from April 1 to December 1, with two draw openings 100 feet in the clear, and with the permanent foundations of its movable piers 18 feet below lowest stage of water, will not be a serious obstacle to navigation.

4th. For the reasons heretofore given, although the question has not been directly referred to it, the board deem the crossing of the river by tunnels the only unobjectionable method; and from all information they have obtained think a tunnel at Detroit * * * is by no means impracticable, at a cost not so great as to debar its construction.

That board also stated that no bridge with draws should be tolerated. There is probably no difference of opinion about these conclusions, except as to the one referring to a bridge with draws.

The form of bridge considered inadmissible by the former board had "a clear headway of only 12 feet provided with two pivot draws, each leaving two openings of 166 feet in the clear, and the remainder of the structure built on piers of masonry 200 feet apart."

It is believed that draw-openings of 166 feet were the greatest then considered practicable; draws of more than 200 feet have been since constructed, and it is now proposed by bridge-builders of high reputation to construct them with openings of 300 feet on each side of a pivot pier, or 400 feet between two pivot piers.

Those who favor the construction of a bridge over the river now admit

that vessels should have the right of way, and say that the draw should always be kept open, except when necessary for the passage of trains at such times as will not interfere with the passage of vessels.

It is the opinion of the board that, with skillful navigators there will be no material difficulty in passing through clear openings of 300 or 400 feet at any time when it would be safe to navigate the river. With the right of way clearly and emphatically given to navigation there would then be no material or undue injury to that interest.

If vessels have the right of way, can the traffic across the river be accommodated?

The board has investigated this matter and finds that with the present traffic there will be ample time during the intervals between the passing of vessels to move all the trains across the bridge. There will occasionally be delays, but the railroads can accommodate their time tables to compensate for any ordinary delays.

Should the traffic increase so that there would not be sufficient time to pass all trains during the season of navigation, the additional cars can be crossed by the ferriage system as at present. This system need not be wholly abandoned, but should be kept available, in case of necessity; indeed it might be requisite, in order to assure regularity of passenger-trains, to depend altogether upon the ferriage system for their transit during the season of navigation.

LOCATION OF BRIDGE.

The board is of the opinion that the bridge should be located at a considerable distance above or below the business portion of the city, so that its use will not be interfered with by the local traffic in front of the city in that part of the river which forms the harbor of Detroit. The two points which seem best suited to the purpose are:

1st. At the lower end of Belle Isle. This is understood to be the least objectionable to the interests opposing the construction of a bridge.

2d. In the vicinity of the foot of Twenty-fourth street, in the city of Detroit.

GENERAL DESCRIPTION OF THE BRIDGE.

There should be placed near the middle of the main channel, on the usual course of through vessels, either a draw-span, with a clear opening of not less than 300 feet on each side of the pivot-pier, or a single clear opening not less than 400 feet between the pivot-piers of two adjacent draw-spans, and, in addition, at least one other draw-span, with a clear opening of not less than 166 feet on each side of the pivot-pier, placed so as to be used for convenience, or in case of accident to the main opening.

The fixed spans should not be less than 450 feet in the clear, and those adjacent to the main opening should have a clear headway of not less than 60 feet, which height is readily attainable, without extraordinary grades.

A considerable portion of the craft plying the lakes will be able to pass under a bridge of this height, and thus obviate the necessity of opening the draw so frequently.

The board would remark that it is not intended to convey the impression that it is of the opinion that such a bridge as has been described will not be to some extent an obstruction. The language of the joint resolution, "material or undue injury," contemplates that there may be some obstruction, and the question the board has considered is, whether, in view of the great interests involved, a bridge can

be constructed which will fulfill these conditions. A good and sufficient tug, as contemplated by the joint resolution, would at times be of assistance in passing the bridge.

In case authority to construct such a bridge in this locality should be granted by Congress, it should be distinctly provided that vessels have the right of way, and the draw be kept open except when trains are passing. That the plan and location be subject to the approval of the Secretary of War; that its construction be subject to his supervision so far as relates to interference with navigation, and severe penalties should be prescribed for any violation of these provisions.

THE TUNNEL.

The board is unanimously of opinion that the most complete solution of the problem is the construction of a tunnel under the river.

This may be located at any point within the limits prescribed by the joint resolution; it is deemed practicable, and if properly constructed will accommodate the railroad traffic, and be no obstruction whatever to navigation.

The following papers are respectfully submitted :

- No. 1. Letter of citizens' committee of Detroit in favor of a bridge.
- No. 2. Letter of General C. B. Comstock in reference to currents in the Detroit River.
- No. 3. Address of Mr. J. F. Joy in favor of a bridge.
- No. 4. Resolutions of the Cleveland, Ohio, Board of Trade against a bridge.
- No. 5. Statement of vessels which passed Fort Gratiot from July 1, 1877, to October 23, 1879.
- No. 6. Statement of vessels passing Grassy Island light during the fiscal year 1878 and the portion of the year 1879 previous to September 30.
- No. 7. Resolution of the Saint Paul, Minn., Chamber of Commerce protesting against a bridge.
- No. 8. Letter from Commander W. R. Bridgman, U. S. N., referring to number of vessels passing Grassy Island light-station.
- No. 9. Letter of the governor of Minnesota transmitting a copy of a letter to the honorable Secretary of War protesting against a bridge.
- No. 10. Number of vessels passing Detroit, Mich., from April 27 to October 31, 1879.
- No. 11. Letter from R. A. Alger and M. S. Smith favoring a bridge.
- No. 12. Letter of James McMillan, chairman of citizens' committee of Detroit, giving number of passengers, passenger and baggage cars crossing at Detroit from the year 1875 to 1879.
- No. 13. Abstract showing number of vessels passing Windmill Point light-house, Fort Gratiot light-house, and the Saint Clair Flats lower light.
- No. 14. Resolution of the Buffalo Board of Trade against a bridge.
- No. 15. Proceedings of the Board of Engineers.

All of which is respectfully submitted.

W. F. RAYNOLDS,

Lieutenant-Colonel of Engineers, Brevet Brigadier-General, U. S. A.

N. MICHLER,

Lieutenant-Colonel of Engineers, Brevet Brigadier-General.

O. M. POE,

Major of Engineers, Brevet Brigadier-General.

D. C. HOUSTON,

Major of Engineers, Brevet Colonel.

I fully concur in the above report as far as relates to the tunnel, but, after a careful examination of the whole subject, I am satisfied that any bridge other than a high one, with spans of at least 450 feet, will be an undue impediment to navigation, and I am not prepared to approve the construction of a drawbridge that I believe a majority of those interested in lake commerce will pronounce a material obstruction to the navigation of this great national highway.

JOHN M. WILSON,

Major of Engineers, Brevet Colonel, U. S. A.

NO. 1.—LETTER OF CITIZENS' COMMITTEE OF DETROIT IN FAVOR OF
A BRIDGE.

DETROIT, MICH., October 16, 1879.

To the Board of United States Engineers commissioned to examine and report upon the crossing of the Detroit River for railroad purposes by bridge or tunnel, within 1 mile above or below the city of Detroit:

GENTLEMEN: We, the members of the citizens' committee deputed to present to your honorable board facts and figures in support of the necessity for and practicability of having a bridge across the Detroit River at or near this city, for railroad purposes, beg to make the following statement:

The present mode of transportation during the entire year of the railroad traffic across the Detroit River at the city from the Michigan Central slip docks is, by car ferry boats, in a southeasterly direction, a distance of about 6,000 feet, and from the Milwaukee Railroad slip, in a southerly course, a distance of about 3,000 feet, to the Canadian shore and Great Western Railway slip docks.

These boats convey each 14, 12, and 8 freight cars at one time; the number of cars ferried at this point during this year will be about 300,000, representing a tonnage of about 3,600,000 tons exclusive of about 180,000 passengers, and United States through and local mails and express. This traffic is largely on the increase, and if the bridge crossing is granted it is safe to say this tonnage and business will be quickly doubled. We append statement showing how this traffic has increased, even with the imperfect means now in use.

The delay, risk, and terrible expense during five months in the year in forcing boats through the very thick and sometimes grounded ice, ferrying this traffic—when all other navigation on the river except ferries is closed—is a very serious drawback to transportation to and from the eight Michigan railroads converging at this city. This fact alone should be sufficient to warrant the construction of a bridge for the passage of this traffic.

We say bridge, because from the large sums of money already expended by the railroad companies in boring the bed of the river within the boundary named in your commission, and in sinking shafts and excavating several drifts under the bed and upon both sides of the river at what was supposed the best locations, we are satisfied that the expense of constructing a suitable and reliable double-track and drainage tunnel is prohibitory to such a mode of crossing.

A bridge of reasonable height above the surface of the water, with draws of not less than 250 feet in the clear, perhaps larger openings can be constructed, and these draws can be worked so expeditiously and in such a manner as will give the vessels a safe right of passage at all times, and satisfy the railroad companies in the transit of their trains of passengers, live stock, and freight.

The bridge can be located at such a point upon the river as will enable the men in charge to see vessels approaching from either direction when a long way distant, and as the draw-bridges, during the seven months of navigation, would remain open for the passage of vessels, and be closed only when trains require to cross, and when no vessels are in close proximity to pass through, there should be no reasonable objection on the part of vessel-owners to this structure.

The proposed draw-openings would give a very much greater area for navigation up and down the river than the same vessels now have in

the Lake Saint Clair Ship Canal, through which all the shipping passes with safety, under far more disadvantageous circumstances than a bridge in this river can possibly present.

The railroad or bridge company's tugs, at their expense, would be in readiness at all times when necessary to assist vessels approaching and passing through the draws.

Of course the plans would be submitted to the Secretary of War for his approval before construction.

To give you some idea of the volume of traffic passing to and from our Michigan railroads centering in this city, we append the following statement of cars ferried to and from the Great Western Railway slips; and if the bridge is constructed here, you can consistently add one-half to the figures of 1879 as a low estimate of the traffic that would at once cross—that would be at least 5,400,000 tons—because we are assured the Canada Southern Railway traffic for Detroit and its districts, in place of crossing at Grosse Isle, and reaching Detroit via Trenton, 18 miles distant, would come to Windsor and Detroit via the proposed Essex Center Line and bridge.

Year.	Cars.	Tons.
1873.....	160, 212	1, 922, 544
1874.....	167, 480	2, 009, 760
1875.....	156, 675	1, 880, 100
1876.....	178, 859	2, 086, 281
1877.....	161, 597	1, 939, 164
1878.....	194, 359	2, 332, 808
1879.....	300, 000	3, 600, 000

To which add the proportion of tonnage from the Canada Southern, which would make, as we have said, about 5,400,000 tons per annum.

All this is exclusive of passenger, mails, and express.

Having submitted a plan showing both shores of the Detroit River, with the various lines of railroad approaching thereto, and also plans of proposed bridges, we beg your favorable consideration of them, and shall be happy to wait upon you at any time or place indicated, and furnish any additional information required.

We are yours, respectfully,

JAMES McMILLAN,
ALANSON SHELEY,
JAMES F. JOY,
G. V. N. LOTHROP,
Of Citizens' Committee.

NO. 2.—LETTER OF GENERAL C. B. COMSTOCK, MAJOR OF ENGINEERS,
IN REFERENCE TO CURRENTS IN THE DETROIT RIVER.

OFFICE OF UNITED STATES LAKE SURVEY,
Detroit, Mich., October 16, 1879.

SIR: At your request, Mr. D. F. Henry has examined some of his note-books of 1869, and states as follows:

I find the following velocities of the river given in the note-books of the "outflow" in 1869, October and November. They are not exactly located, as they were only taken in testing meters—part of them in fast and part in slow currents.

Near the head of Belle Isle in the Canada channel two series of observations giving 2,525 and 2,672 feet per second, or about $1\frac{1}{2}$ miles per hour.

In the same channel farther down, at 10 feet depth, 2,200; at 20 feet depth, 2,146; and at 25 feet depth, 2,025 feet per second, or about $1\frac{1}{2}$ miles per hour.

In the American channel near the foot of Belle Isle, near the surface, two series, giving 1,680 and 1,726 feet per second, or about $1\frac{1}{4}$ miles per hour.

Very respectfully,

C. B. COMSTOCK,
Major of Engineers, Brevet Brigadier-General, U. S. A.

General W. F. RAYNOLDS,
U. S. Engineers, Detroit, Mich.

No. 3.—ADDRESS OF MR. J. F. JOY, IN FAVOR OF A BRIDGE.

DETROIT, MICH., October 18, 1876.

To the Board of United States Engineers commissioned to examine and report upon the crossing of the Detroit River for railroad purposes, by bridge or tunnel, within 1 mile above or below the City of Detroit :

GENTLEMEN: In my statement before you this morning I gave the number of vessels passing the river at Detroit, as reported by the marine reporter for the press, as follows:

	Passing up.	Passing down.
Propellers.....	961	1,041
Steam-barges.....	979	1,151
Schooners.....	2,468	2,253
Total.....	4,408	4,445
In all.....		8,853
The barges which were towed were not included in this, which are estimated at.		1,500
All told, making a grand total of.....		10,353
Take the schooners together, and barges towed both ways, and they number..		6,221
Then the propellers and steam-barges together.....		4,132
Making a total of		10,353

Assuming that the schooners and barges towed are three in a tow, and you have 2,074 tows. Added to the number of steam-barges and propellers, and you have 6,206 passages through the draws in the course of a year.

There are in the seven months of navigation 5,136 hours; you have one and one-fifth passages in an hour, on the average, and these at very irregular times, and sometimes several hours intervening. With this navigation there is a very large space of time left for the passage of trains, even if there is only one draw. These are the vessels that carry the great commerce of the lakes. The other crafts of all sorts and sizes, which come and go from the port of Detroit, Mr. Bissel thinks, amount to as many more.

These craft include scows for wood and lime, and every possible kind of small boat which come to and go from Detroit. These are a loose craft, engaged in no long trade. They are small craft; they are easily managed, quickly handled, might go through a draw 250 feet wide, sideways, two or three, end to end, at once.

So far as that class of craft is concerned, as I have said, there is no difficulty in handling it, and a vast quantity of it would not go through a draw in any event—much of it wood-scows, engaged in traffic in and around Lake Saint Clair and Saint Clair River in bringing wood, lime, and stone to this city, and other supplies of various kinds from below as well as above.

But suppose we estimate that every one of them wants to go through a draw every time they want to come to Detroit, and want to go through singly, which is not at all supposable, then we should have about 16,000 passages. That would be about three in one hour, on an average, with one draw. But all these might pass the draw not used by the vessels engaged in the long trade. This small craft passing singly would go through the draw in two or three minutes. A long tow would take some longer; but when you consider how irregularly they go and sometimes two or three together, up and down, I think we may fairly estimate that one-half of the whole time may be left to the railroad companies, if, as I say, there were but one draw, to pass and repass the bridge with their trains, which is very much greater time than would be required for that service. With the two draws in use there would be still much more time for railway trains to pass. With a double-track bridge, and with openings altogether equal to 1,000 feet for all these various kinds of craft to pass through, it can hardly seem possible that there ought to be any difficulty in accommodating both the railways and the commerce of the country, while the one passes over and the other passes along the river. This small craft stopping at Detroit and starting from there is not like the large vessels and propellers engaged in the large commerce of the lakes, which ordinarily passes by Detroit on its way up and down the lakes. That kind of vessel, whether passing in tows or singly, ought to have the right of way, and the passage of trains should give way to them.

The smaller craft, stopping and starting from Detroit largely and so easily managed, need not necessarily have the right of way, and can easily pass either draw. It is for this reason that I have suggested that there should be no iron rule concerning the use of the bridge. The use of it, and the rules for passing of vessels, should be all the time under the control of the Secretary of War. He can have, and from time to time make, such rules as are found expedient and necessary, having reference to the kind of craft which may pass through. I inclose the note which contains my figures.

I will add that cases have frequently come before the Supreme Court of the United States for collision against bridges. In order that the commission may have before it the law and the reasons of it, I will allude to a late one which occurred on the Mississippi River, which came before that court, and which I now mention because the court took occasion to dispose of the complaints of those engaged in navigation, and used language especially applicable to Detroit River. The language used by it also has a direct bearing upon the language of the order of the Secretary of War, and the resolution of Congress. I mean the words "undue injury to navigation caused by building a bridge."

The case is that of the *Möhler*, a steamer drawing barges loaded with wheat down the river. It is found in the 21st Wallace's S. C. Reports, page 230.

The barge towed was wrecked by collision with one of the piers of a bridge just above Saint Paul, and totally lost. The wind was blowing; high bluffs line the side of the river and prevent boats feeling the wind till just before reaching the bridge, when they recede and open, and do not operate as a protection against the wind. On reaching that point in the river the wind would be strongly felt by the boat. It was very heavy, as was testified, when the boat reached the bridge. It was too late to change the course of the boat or make a landing, and collision was inevitable, according to the testimony.

It would be well for the commission to read the whole case, but I

quote the language of the court, which meets the point I wish to make. It was the unanimous opinion of the whole court:

Any prudent officer would have stopped until the weather became calm. At any rate it was the duty of the master of the boat in question to have done so, and, failing in this duty, he is chargeable with the consequences of his negligence, which in this case were lamentable, for not only was the property in his charge destroyed, but a human life lost.

The officers of steamers plying the western waters must be held to the full measure of responsibility in navigating streams where bridges are built across them. These bridges, supported by piers, of necessity increase the dangers of navigation, and river men, instead of recognizing them as lawful structures built in the interests of commerce, seem to regard them as obstructions to it, and apparently act on the belief that frequent accidents will cause their removal. There is no foundation for this belief. Instead of the present bridges being abandoned more will be constructed.

The changed condition of the country, produced by the building of railroads, has caused the great inland waters to be spanned by bridges; these bridges are, to a certain extent, impediments in the way of navigation, but railways are highways of commerce as well as rivers, and would fail of accomplishing one of the main objects for which they were created, the rapid transit of persons and property, if rivers could not be bridged. It is the interest as well as the duty of all persons engaged in business on the water routes of transportation to conform to this necessity of commerce; if they do this and recognize railroad bridges as an accomplished fact in the history of the country, there will be less loss of life and property, and fewer complaints of the difficulties of navigation at the places where these bridges are built. If they pursue a different and contrary course it rests with the courts of the country in every proper case to remind them of their legal responsibility.

This case places strikingly before you what kind of obstructions are not an undue impediment to navigation; and also the necessity of bridges, and as many as the commerce of the country requires, and the fact that commerce goes by the rail as well as by water, and that to some extent the one must give way to the other, and that both must be so managed and treated that all the ways of commerce must be opened, and that neither shall act or be protected to the undue prejudice of the other, and especially that one shall not and cannot claim free and entirely unrestricted passage to the great detriment of the other.

The bridge is a necessity, and navigation must recognize it, and then both must, in a friendly way, and under some general regulations made by the department, so conduct their business as in the least degree to injure each other.

I am, with great respect, yours truly,

JAMES F. JOY.

DETROIT, MICH., *October 17, 1879.*

Hon. JAMES F. JOY:

Mr. James Westcott, the marine reporter at this port, had published at the close of navigation last year in the Detroit papers the following statement regarding vessels' passages during the season of 1878:

Passed down.		Passed up.	
Propellers	1, 041	Propellers	961
Steam-barges	1, 151	Steam-barges	979
Schooners	2, 253	Schooners	2, 468
Total	4, 451	Total	4, 408
		Total	4, 451
		Grand total	8, 859

It was stated that the above did not include barges that were towed either way, which may be safely estimated at not exceeding 1,500 more; this added would make the whole number 10,359, and from my own experience I believe the statement is correct.

J. W. HALL.

No. 4.—RESOLUTIONS OF THE CLEVELAND, OHIO, BOARD OF TRADE
AGAINST A BRIDGE.BOARD OF TRADE ROOMS,
No. 122 Water Street, Cleveland, Ohio, October 18, 1879.

SIR: I have the honor to inform you that at a regular meeting of the Cleveland Board of Trade held to-day, the following preamble and resolutions were unanimously adopted:

Whereas the Board of Trade of this city is informed that the Board of Engineers provided for by the joint resolution of Congress to examine and report as to the feasibility of bridging or tunneling the Detroit River are now at the city of Detroit, and ready to proceed with their work; and believing that each city on the line of the northern chain of lakes is deeply interested in this subject, and that Cleveland should protest with others against any plan that will in any way obstruct a free use of the Detroit River for the large commercial traffic passing through that noble line of communication: Be it therefore,

Resolved by this board, That not any obstruction be placed across said river at any point by way of a bridge, believing that such structure would greatly interfere with the free navigation of that stream, and delay the passage of sail, steam, and other water craft navigating the same, while the interests of the railroads and the public can as well be served by the construction of a tunnel under said river.

Resolved, That R. K. Winslow, esq., Capts. A. Bradley and W. B. Guyles constitute a committee, and that they have full power from this board to watch the interests of the lake, and carry out the interest of these resolutions in conjunction with other cities interested.

Resolved, That the secretary be required to forward a copy of these resolutions to Col. W. F. Reynolds, chairman of the investigating board at Detroit.

Yours, truly,

THEODORE SIMMONS,
Secretary.

Mr. W. F. RAYNOLDS,
Chairman Board of Engineers, Detroit, Mich.

No. 5.—Statement of vessels which passed Fort Gratiot light from July 1, 1877, to October 23, 1879.

Month.	Fiscal year ending June 30, 1878.							Fiscal year ending June 30, 1879.							Quarter ending September 30, 1879.*						
	Barges.	Barks.	Brigs.	Schooners.	Scows.	Steamers.	Total.	Barges.	Barks.	Schooners.	Scows.	Steamers.	Brigs.	Total.	Barges.	Barks.	Brigs.	Schooners.	Scows.	Steamers.	Total.
July	664	74	15	1,270	259	1,724	4,006	503	60	838	132	1,268	3	2,804	740	74	4	1,166	166	1,541	3,691
August	643	99	14	1,301	218	1,611	3,886	600	76	911	190	1,328	7	3,112	739	94	11	1,161	195	1,561	3,761
September	646	117	12	1,243	191	1,653	3,862	684	77	951	188	1,343	11	3,254	940	82	8	1,390	189	1,655	4,264
October	553	96	14	1,100	90	1,563	3,416	531	67	871	118	1,357	3	2,947	693	70	8	1,162	131	1,450	3,514
November	345	43	1	582	56	1,012	2,039	455	42	612	73	1,045	.....	2,227	.....	.....	.....	.....	.....	.....	.....
December	17	.....	.....	14	3	91	125	24	2	41	8	121	.....	196	.....	.....	.....	.....	.....	.....	.....
January .....	.....	.....	.....	.....	1	4	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
February .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
March	4	.....	.....	5	15	66	90	.....	.....	.....	.....	28	.....	28	.....	.....	.....	.....	.....	.....	.....
April	364	57	1	581	78	1,000	2,081	116	8	71	27	208	.....	430	.....	.....	.....	.....	.....	.....	.....
May	660	74	4	939	163	1,424	3,264	679	120	1,006	205	1,461	2	3,473	.....	.....	.....	.....	.....	.....	.....
June	612	98	12	1,088	188	1,438	3,436	803	71	1,090	167	1,546	6	3,683	.....	.....	.....	.....	.....	.....	.....
Totals	4,508	658	73	8,123	1,262	11,586	26,210	4,395	523	6,391	1,108	9,705	32	22,154	3,112	220	31	4,879	681	6,207	15,230

*Including twenty-three days of the month of October, 1879.

NO. 6.—STATEMENT OF VESSELS PASSING GRASSY ISLAND LIGHT DURING FISCAL YEAR 1878, AND THE PORTION OF THE YEAR 1879 PREVIOUS TO SEPTEMBER 30.

OFFICE OF LIGHT-HOUSE INSPECTOR, TENTH DISTRICT,
Buffalo, N. Y., November 5, 1879.

SIR: In compliance with instructions from the Light-House Board of date the 24th ultimo, I send you subjoined a statement of the vessels reputed by the keeper as passing Grassy Island light-station during the fiscal year 1878, and that portion of the year 1879 previous to September 30, as follows, viz:

Steamers.	Barges (towed).	Brigs.	Schooners.	Scows.	Rafts.	Total.
11, 884	4, 946	862	8, 046	2, 012	68	27, 818

Very respectfully,

W. R. BRIDGMAN,

Commander U. S. N., Light-house Inspector, Tenth District.

Gen. W. T. RAYNOLDS, U. S. A.,

(Care of Light-House Engineer, Eleventh District, Detroit, Mich.)

NO. 7.—RESOLUTION OF THE SAINT PAUL, MINN., CHAMBER OF COMMERCE PROTESTING AGAINST A BRIDGE.

CHAMBER OF COMMERCE,
No. 17 WEST THIRD STREET, ROGERS' BLOCK,
Saint Paul, Minn., November 21, 1879.

To the Honorable Board of Engineers, Detroit, Mich.:

GENTLEMEN: In accordance with the resolutions of the Chamber of Commerce of this, the chief commercial city of the State, copy of which is hereto appended, I have the honor, on the part of that body, respectfully to protest against any project for building a bridge across the Detroit River. The people of Minnesota, in common with those of the other States bordering upon the upper lakes are deeply interested in the maintenance intact, of communication by water with the ocean, and they are unanimous in remonstrating against obstruction to free and safe navigation. The vast products of this State, and of the Territories west of it, which are rapidly augmenting from year to year with the influx of population, can with difficulty even now be transported to the markets of the East, with all the facilities that can be afforded, and it is of vital importance to this new Northwest, that every practicable outlet for freight be enlarged, rather than diminished by the erection of such barriers to safe transit as a bridge of any kind over the Detroit River.

Very respectfully, your obedient servant,

HENRY W. SIBLEY,

President.

Resolved, That this chamber does earnestly protest, on behalf of the commercial interests of this State, against the construction of a bridge across or the erection of any obstruction to navigation in the Detroit

River, which is the gateway of all the commerce of the Northwest; and we hereby request the president of this chamber to draw and forward to the honorable Board of Engineers about to consider and determine the question of the construction of such a bridge a formal protest against such construction, accompanied by such statements and statistics as have a bearing upon the question involved.

Resolved, That the president of this chamber be requested to wait upon the governor of this State and request him to prepare and forward to the honorable Secretary of War an official communication setting forth the great interests in Minnesota involved in the construction of such a bridge across the Detroit River, and earnestly protesting against such construction, and that the governor be requested to forward a copy of such letter to the said Board of Engineers.

Resolved, That our Senators and Members in Congress be requested to co-operate with the governor in resisting the proposed scheme of constructing a bridge across the Detroit River.

NO. 8.—LETTER FROM COMMANDER W. R. BRIDGMAN, U. S. N.,
REFERRING TO THE NUMBER OF VESSELS PASSING GRASSY ISLAND
LIGHT STATION.

OFFICE OF LIGHT-HOUSE INSPECTOR, TENTH DISTRICT,
Buffalo, N. Y., November 12, 1879.

SIR: As the language of my letter of date the fifth instant is apparently ambiguous, I desire to say further that the statement therein given is an exhibit of the number of vessels reported as passing Grassy Island light house between July 1, 1878, and September 30, 1879, both dates inclusive.

Very respectfully,

W. R. BRIDGMAN,

Commander U. S. N., Light-house Inspector, Tenth District.

Gen. W. F. RAYNOLDS, U. S. A.,

(Care Light-house Engineer, Eleventh District, Detroit, Mich.)

NO. 9.—LETTER OF THE GOVERNOR OF MINNESOTA TRANSMITTING A
COPY OF A LETTER TO THE HONORABLE THE SECRETARY OF WAR,
PROTESTING AGAINST A BRIDGE.

STATE OF MINNESOTA, EXECUTIVE DEPARTMENT,
Saint Paul, November 14, 1879.

To the honorable Board of Engineers, Detroit, Mich.:

GENTLEMEN: By request of the Saint Paul Chamber of Commerce, I have the honor to transmit herewith a copy of a letter addressed by me to the Hon. Secretary of War, protesting against the construction of the proposed bridge across Detroit River, as a serious obstruction to the free navigation of the great lakes, and detrimental to the commercial interests of Minnesota, and of the vast country to the northwest.

Very respectfully,

J. S. PILLSBURY,
Governor Minnesota.

STATE OF MINNESOTA, EXECUTIVE DEPARTMENT,
Saint Paul, November 14, 1879.

SIR: In compliance with a resolution of the Chamber of Commerce of Saint Paul, and pursuant to my own convictions upon the subject, I beg leave to respectfully but earnestly protest against the construction of a bridge across Detroit River, the consideration of which I understand is to be before the board of engineers to meet in Detroit on the 18th instant.

I need scarcely state that the vast and growing commercial interests of this State and of the rapidly settling country north and west demand unobstructed navigation through the great lakes and their connecting channels.

It is indeed difficult to exaggerate the magnitude of these interests or the rapidity of their development. The annual wheat export of this State alone averages 25,000,000 bushels, a large proportion of which seeks water transit to the seaboard, via the great lakes. A much larger proportion of the growing products of Dakota are dependent upon this route alone for the means of reaching a market, while the transportation which will be required with the development of the agricultural and mineral resources of the vast country drained by the Northern Pacific Railroad baffles computation. An ample and unimpeded water communication must for a long time be the only defense of these growing interests against railroad combinations, with whose freight exactions they are constantly threatened. Anything, therefore, which jeopardizes this free water transit as a means of competition in transportation is justly a cause of alarm. That the proposed bridge over the Detroit River will prove an obstruction to such free navigation cannot be doubted, and I therefore, in behalf of the people of this State, of the vast country whose interests are deeply involved, protest against its construction.

Most respectfully, your obedient servant,

J. S. PILLSBURY,
Governor Minnesota.

HON. GEORGE W. McCRARY,
Secretary of War, Washington, D. C.

NO. 10.—NUMBER OF VESSELS PASSING DETROIT, MICH., FROM APRIL
 27 TO OCTOBER 31, 1879.

DETROIT, MICH., *November 17, 1879.*

DEAR SIR: Of the class of vessels that I report there have passed here from April 27 to October 31—

As taken from my books.....	16, 196
Estimate for November, same average.....	2, 598
Small craft that I do not report	12, 600
	31, 394

Yours, very respectfully,

GEO. W. BISSELL, Esq., *City.*

J. W. WESTCOTT.

The number of tons transported through the river during the season of 1879, the month of November being estimated on the basis of the previous part of the season, was 12,006,000.

No. 11.—LETTER FROM R. A. ALGER AND M. S. SMITH FAVORING A BRIDGE.

DETROIT, MICH., *November 17, 1879.**To the Board of United States Engineers, sitting at Detroit:*

GENTLEMEN: We are engaged in the long timber business, which is getting out long pine timber, making it into rafts on Lake Huron, and towing it principally to Toledo, Cleveland, and Tonawanda.

During the season of 1879 we have towed of our own timber over 40,000,000 feet, board measure, down through Detroit River, which is a large majority of all the long timber cut and rafted down through the lakes. Our rafts range in size from 1,000,000 to 2,000,000 feet. A raft of 1,000,000 feet would average about 1,800 feet long and 100 feet wide, and for each quarter of a million feet, 25 feet in width may be added at the outside, but nothing in length, as rafts are usually about the same length, and are enlarged by adding to the width. A good average raft contains about 1,500,000 feet. A raft containing 2,500,000 feet would measure 250 feet scant across it. This is an oversize raft, and larger than ought to be towed at one time.

While our business as shown above is large, it is our opinion that a bridge, with an opening of from 250 to 300 feet in a straight current like that in front of this city, would be no detriment to us, and with reasonable care exercised by the master of the tug towing rafts would not materially add to the risk and danger of towing.

This opinion is *entirely concurred in* by Capt. Thomas Hackett, master of our large tug Vulcan. Captain Hackett, who has sailed a tug for us for the past eleven years, and has towed over 200 rafts and a large number of vessels, entirely concurs in this opinion.

He says the difficulties and dangers of passing through a bridge in a straight current and deep water with tows of vessels would be very much less than that of entering the Saint Clair Flats Canal with its shallow water, and especially at the upper end where the current sets outside the canal both ways.

Believing that the business and welfare of the country need a bridge across the river at this point, and that with proper care exercised by masters of vessels such a bridge will not materially add to the dangers of navigation, we very respectfully and most earnestly ask you to report in favor of the project of building such a bridge.

Very respectfully,

R. B. ALGER.
M. S. SMITH.

No. 12.—LETTER OF JAMES M'MILLAN, CHAIRMAN CITIZENS' COMMITTEE, DETROIT, GIVING NUMBER OF PASSENGERS, PASSENGER AND BAGGAGE CARS, CROSSING AT DETROIT, FROM THE YEAR 1875 TO 1879.DETROIT, MICH., *November 19, 1879.**To the Board of United States Engineers on repropoed Detroit River Bridge:*

GENTLEMEN: Referring to a report made by the Citizens' Committee to your honorable board on the 16th October, in the body of which the number of freight cars and tonnage for each year since 1875 inclusive was shown, permit me on behalf of said committee to supplement the

report above referred to with the following figures, having reference to the passenger business:

Years.	Passenger-cars.	Baggage-cars.	Passengers.
1875	13, 168	3, 865	192, 318
1876	13, 565	4, 683	209, 630
1877	12, 976	5, 143	140, 285
1878	12, 258	3, 873	129, 113
1879	12, 500	4, 200	162, 500

The above figures are official, having been furnished me by Mr. Broughton, general manager of the Great Western Railway.

Yours faithfully,

JAS. McMILLAN,
Chairman Citizen's Committee.

NO. 13.—ABSTRACT SHOWING NUMBER OF VESSELS PASSING WINDMILL POINT LIGHT-HOUSE, FORT GRATIOT LIGHT-HOUSE, AND THE SAINT CLAIR FLATS LOWER LIGHT.

OFFICE OF LIGHT-HOUSE INSPECTOR,
ELEVENTH DISTRICT,
Detroit, Mich., November 20, 1879.

DEAR SIR: As requested in your communication of this date, I inclose herewith a tabulated statement taken from the quarterly reports of the keeper of Windmill Point light, showing the number and kind of vessels passing that station during the years 1878 and 1879.

I would suggest that the reports of the keeper do not embrace all the vessels that pass that station, for there being only one keeper, he is not required to be always on watch, and many vessels no doubt pass that are not recorded.

As it may be of some service to your board, I also inclose statements showing the vessels that passed the Fort Gratiot and Saint Clair Flats Canal (lower) lights during the year 1878, and from the opening of navigation to June 30, 1879.

The report of passing vessels is now made annually instead of quarterly as heretofore, so that for the latter stations I have information only up to the date mentioned, but for Windmill Point a special report was made by the keeper up to November 1, 1879.

I consider the statement for Fort Gratiot light the most accurate, as there are two keepers at the station and both of them are sailors, who take an interest in keeping a correct record of the vessels that pass their light.

Very truly, yours,

J. N. MILLER,
Light-house Inspector, Eleventh District.

Lieut. Col. W. F. RAYNOLDS,
Brevet Brigadier-General United States Army.

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OFFICE OF LIGHT-HOUSE INSPECTOR,
ELEVENTH DISTRICT,
Detroit, Mich., November 20, 1879.

Abstract from keeper's returns of vessels passing the Windmill Point light-station during the year 1878, and from the opening of navigation to November 1, 1879.

	Three-masted vessels.	Brigs.	Schooners.	Sloops.	Steamers.	Totals.
First quarter, 1878	1		76	19	76	172
Second quarter, 1878	928	2	1,758	223	2,260	5,171
Third quarter, 1878	871		1,942	178	2,597	5,588
Fourth quarter, 1878	468		1,081	77	1,641	3,267
Total for 1878	2,268	2	4,857	497	6,574	14,198
First quarter, 1879						
Second quarter, 1879	396		1,865	124	2,241	4,626
Four months, 1879	729	1	4,240	260	4,901	10,131
Total for 1879	1,125	1	6,105	384	7,142	14,757

J. N. MILLER,
Commander United States Navy, Inspector Eleventh District.

OFFICE OF LIGHT-HOUSE INSPECTOR,
ELEVENTH DISTRICT,
Detroit, Mich., November 20, 1879.

Abstract from keeper's returns of vessels passing Fort Gratiot light-station during the year 1878, and from the opening of navigation to June 30, 1879.

	Barges.	Barks.	Brigs.	Schooners.	Scows.	Steamers.	Totals.
First quarter, 1878	4			5	16	70	95
Second quarter, 1878	1,636	229	17	2,608	429	3,862	8,781
Third quarter, 1878	1,787	213	21	2,700	510	3,939	9,170
Fourth quarter, 1878	1,010	111	3	1,524	199	2,523	5,370
Total for 1878	4,437	553	41	6,837	1,144	10,394	23,416
First quarter, 1879						28	28
Second quarter, 1879	1,598	199	8	2,167	399	3,215	7,582
Total	1,598	199	8	2,167	399	3,243	7,610

J. N. MILLER,
Commander United States Navy, Inspector Eleventh District.

OFFICE OF LIGHT-HOUSE INSPECTOR,
ELEVENTH DISTRICT,
Detroit, Mich., November 20, 1879.

Abstract from keeper's returns of vessels passing Saint Clair Flats Canal lower light-station during the year 1878, and from the opening of navigation to June 30, 1879.

	Three-masted vessels.	Schooners.	Steamers.	Total.
First quarter, 1878.....		6	41	47
Second quarter, 1878.....	17	2, 114	1, 804	3, 935
Third quarter, 1878.....	28	2, 700	1, 960	4, 688
Fourth quarter, 1878.....	20	1, 863	1, 474	3, 357
Total for 1878.....	65	6, 683	5, 279	12, 027
First quarter, 1879.....				
Second quarter, 1879.....	30	2, 192	1, 943	4, 165
Total.....	30	2, 192	1, 943	4, 165

J. N. MILLER,
Commander United States Navy, Inspector Eleventh District.

NO. 14.—RESOLUTION OF THE BUFFALO BOARD OF TRADE AGAINST
A BRIDGE.

BUFFALO BOARD OF TRADE,
Buffalo, N. Y., November 20, 1879.

At a meeting of members of the Buffalo Board of Trade held this morning on 'change, the president, Jewett M. Richmond, esq., in the chair, the following preamble and resolutions were offered by Townsend Davis, esq., and on motion unanimously adopted:

Whereas, the Board of Trade of the city of Buffalo learn that a commission, empowered by Congress, is now in session at Detroit for the purpose of determining whether a tunnel under the Detroit River, or a bridge across that stream, should be built; and whereas this board regards the question as one of great importance to the commerce of the lakes and of the country; and whereas it is the opinion of this board that the creation of a bridge across the river would be an obstruction to navigation, and in direct opposition to the principle of the great ordinance by which it was proposed forever to establish the freedom and promote the facilities of commerce upon the great waters of the Northwest, and in conflict with the substance of that decision of the Supreme Court of the United States declaring the international character of those waters; and as a practical question in conflict also with the best business intelligence of the country: Now, therefore, it is

Resolved, That in the opinion of this Board of Trade the bridging of the Detroit River at or near Detroit would be a great injury to commerce and leading business interests of the country; and this board most earnestly requests the commission to report in the strongest terms against the erection of such bridge.

Correct extract from minute-book.

WILLIAM THURSTONE,
Secretary.

NO. 15.—PROCEEDINGS OF THE BOARD OF ENGINEERS CONVENED BY S. O. No. 213, A. G. O., WASHINGTON, D. C., SEPTEMBER 15, 1879, IN ACCORDANCE WITH THE JOINT RESOLUTION OF CONGRESS APPROVED JUNE 20, 1879.

OCTOBER 14, 1879.

The board, in pursuance with the call of the senior member, met at the Russell House, Detroit, Mich., at 10 o'clock a. m.; present, all the members, as follows:

Lieut. Col. W. F. Reynolds, Corps of Engineers.

Lieut. Col. N. Michler, Corps of Engineers.

Maj. O. H. Poe, Corps of Engineers.

Maj. D. C. Houston, Corps of Engineers.

Maj. J. M. Wilson, Corps of Engineers.

There being no funds available for the expenses of the board, upon the invitation of Maj. C. B. Comstock, Corps of Engineers, the members proceeded to the office of the Lake Survey, where a room and the necessary stationery were provided.

The order convening the board and the joint resolution in reference thereto were read; the latter is as follows:

Whereas recent progress in the art has shown the practicability* of constructing bridges having spans of 500 feet or possibly more: Therefore

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of War is hereby authorized and required to convene a board of officers of the Corps of Engineers of the Army whose duty it shall be to inquire into and report whether for railroad purposes the river Detroit can be bridged or tunneled at the city of Detroit or within one mile above or below said city, in such a manner as to accommodate the large trade and commerce crossing the river at that point, and without material or undue injury to the navigation of said river, a good and sufficient tug being always kept by bridge-owners to assist any craft when desired.

The board discussed the object of its session and the best method of proceeding under the resolution. Mr. James McMillan, of Detroit, appeared before the board and stated, on behalf of the citizens' committee of Detroit, that several prominent citizens desired to be heard on the subject under consideration.

The board decided to hear the opinions of all parties who were desirous of submitting them, and requested the newspaper reporters to so state to the public. At 12.30 p. m., the board adjourned to meet at 2.30 p. m.

OCTOBER 14.

AFTERNOON SESSION.

The board met at 2.30 p. m., all the members being present.

General Wm. Sooy Smith, at the request of the board, read a very interesting paper explaining his plan for a tunnel under the Detroit River; he presented a copy of his paper to the board, stating that he desired to be understood not as opposing a bridge, but as offering the tunnel plan as an alternative.

Mr. James McMillan, Hon. John S. Newberry, and Mr. W. K. Muir appeared before the board.

Mr. McMillan presented a pamphlet containing letters of Mr. James F. Joy and others reviewing the report of the Board of Engineers convened in 1873 on this subject, and also a pamphlet containing a letter from Mr. Joy addressed to the previous Board of Engineers, comparing the amounts invested in railroads and water transportation.

Mr. W. K. Muir presented for the consideration of the board charts

showing the river in front of the city and the location of bridges proposed above and below; the former is to leave the city at Mount Elliot avenue, crossing the foot of Belle Isle and landing at Wilkesville; this bridge would have two draws, one with two openings of 300 feet each in the Canadian channel and one of 150 feet in the American channel. Hon. J. S. Newberry then addressed the board at length in favor of bridging the Detroit River.

At 5 o'clock p. m. the board adjourned to meet at 9.30 a. m. October 15, 1879.

WEDNESDAY, *October 15, 1879.*

The board met at 9.30 a. m., all the members being present.

General Wm. Sooy Smith, presented informally, for the information of the Board of Engineers only, drawings showing his plans for a caisson tunnel under the Detroit River.

Lieutenant-Colonel Reynolds stated that the board had spent the previous in day hearing a sort of desultory talk from those interested in the subject of crossing the river, without any very definite views one way or another. He stated that the question before the board was whether for railroad purposes the Detroit River could be bridged or tunnelled so as to accommodate the large trade and commerce crossing the river at that point without material or undue injury to the navigation of said river. He further stated that he thought the first thing required was a statement in writing from the bridge people as to what they proposed to build there.

The board fully discussed the subject before them, and at half-past ten a. m., Mr. George W. Bissell, of Detroit, Mich., as the representative of the vessel owners, presented his views against permitting the construction of a bridge across the Detroit River; he objected to draw-bridge with two clear openings, each 300 feet wide, and believed that it would be an undue impediment to navigation, although far less obnoxious than a bridge with openings of only 160 feet; he thought such a bridge a greater impediment than the Saint Clair Flats Canal, on account of the currents, and believed that no bridge with a less opening than 600 feet would satisfy the vessel owners and those interested in navigation.

The board discussed the question as to what data was required for their information in connection with the commerce of the lakes. Mr. Bissell promised to provide full information upon this subject.

Mr. D. Farrand Henry, an expert who made observations on currents in the Detroit River, appeared before the board and gave the result of his surveys from memory; he stated that the swiftest current between Belle Isle and the Canadian shore was about 2 miles an hour, that off the docks near the water-works it was about $\frac{3}{4}$ of a mile an hour, and above the Marine Hospital about 1 mile per hour.

At 12.30 p. m. the board adjourned to meet at 2.30 p. m.

OCTOBER 15, 1879.

AFTERNOON SESSION.

The board met at 2.30 p. m.; present, all the members.

Mr. James F. Joy addressed the board in the interest of those favoring the construction of a bridge. He laid stress on the fact that if a bridge was built the vessels should invariably have the right of way.

Mr. F. K. Muir stated that on the Great Northern Railway of England there was a draw weighing 750 tons that was opened and closed in 50 seconds, its length was unknown to him.

Mr. G. W. Bissell asked the board to adjourn until the middle of No-

vember, in order to give time to collect data as to the number of vessels and the tonnage which passed through the Detroit River.

Mr. McMillan, on behalf of the railroad interests, asked that as much time be given them as was given the representatives of the vessel interests.

The senior member, at the request of the board, sent the following telegram:

DETROIT, MICH., *October 15, 1879.*

To the ADJUTANT-GENERAL, U. S. A.

(Through the Chief of Engineers), *Washington, D. C.:*

Can the board constituted by S. O. No. 213, current series, be authorized to adjourn for a time to obtain statistics and to reconvene upon the order of the senior member.

RAYNOLDS,

Senior Member of the Board.

Messrs. Newberry and McMillan invited the board to examine the river upon their private yacht. The invitation was accepted with the understanding that the vessel interests would be represented during the trip. At 4.30 p. m. the board adjourned to meet at 10 a. m., October 16, on board the yacht Truant.

THURSDAY, *October 16, 1879.*

The board met at 10 o'clock a. m. on the steam-yacht Truant, which was placed at their disposal through the courtesy of Messrs. Newberry and McMillan, and, in company with representatives of the bridge and vessel interests, proceeded to examine the Detroit River above and below the city, and particularly at the localities where bridges were proposed.

At 12.30 p. m. the board adjourned to meet at 2.30 p. m. at the Lake Survey office.

At 2.30 p. m. the board met, all the members being present.

Mr. George W. Bissell presented statistics in reference to the passage of vessels through the Detroit River during the season of 1879 up to October 15, and addressed the board on the subject. The board discussed the statistics presented.

Mr. D. Farrand Henry presented a statement of the currents in the river, as follows:

Near the head of Belle Isle, in the Canada channel, at the surface, $2\frac{5.25}{10.00}$ feet per second; at a depth of 10 feet, $2\frac{2}{10}$ feet per second; at 20 feet, $2\frac{14.6}{10.00}$ feet per second; at 25 feet, $2\frac{0.25}{10.00}$ feet per second; in the American channel near the foot of Belle Isle, two series of observations gave $1\frac{6}{10}$ feet per second and $1\frac{7.25}{10.00}$ feet per second respectively.

Mr. John W. Burt, as the representative of the citizens' tunnel committee, expressed a desire to present to the board his views, together with plans, estimates, &c., in reference to a tunnel across the Detroit River, but stated that he was not quite ready. The board agreed to hear him on the morning of the 17th inst.

At 5 p. m. the board adjourned to meet at 9.30 a. m. on the 17th inst.

FRIDAY, *October 17, 1879.*

The board met at 9.30 a. m. Present, all the members.

Mr. Hobson, representing the general manager of the Great Western Railroad, presented a statement of the number of cars crossing the Detroit River, which was placed on file.

Mr. J. W. Burt, as chairman of the citizens' tunnel committee, appointed to confer with the board, addressed the board at length upon the subject of a tunnel, and presented certain plans, &c., for its information.

After a general discussion of the whole subject before them, the board at 12 m. adjourned to meet at 2.30 p. m., to hear such citizens as desired to appear before them.

FRIDAY, *October 17.*

AFTERNOON SESSION.

At 2.30 p. m. the board met, all the members being present.

Mr. James W. Bartlett, superintendent of the Detroit Locomotive Works, addressed the board upon the subject of impediments to navigation at the Saint Clair Flats Canal, and stated that he had frequently seen long tows, in a heavy cross wind, come to anchor and tow down singly.

Mr. G. W. Bissell addressed the board on the subject of vessels drifting in the river with a heavy cross wind, and the danger incident thereto in case the river was bridged.

Mr. James McMillan, on behalf of the citizens' bridge committee, presented a statement in writing favoring the construction of a bridge and giving statistics in reference to railroads. The communication was placed on file.

At 4 p. m., there being no other persons present who desired to address the board, it adjourned to meet at 9.30 a. m. on Saturday the 18th instant.

SATURDAY, *October 18, 1879.*

The board met at 9.30 a. m., all the members being present.

Messrs. H. B. Ledyard, J. B. Mulliken, James F. Joy, W. K. Muir, G. V. N. Lothrop, G. W. Bissell, J. W. Burt, William Scott, and others interested in the subject, were present.

The senior member of the board asked Mr. Ledyard, who represented the railroad interests, to make any statement to the board that he desired. Mr. Ledyard replied that he did not think that he had any particular statement to make; that he presumed he was to be cross-questioned. He then addressed the board upon the subject of the bridge, and stated that the railroad interests were not prepared to offer one of a greater height than 15 feet above high-water mark, and that it would propose two draws with openings of 250 feet, one draw over each channel, and with spans of 400 feet, possibly 500 feet.

Mr. J. B. Mulliken, general superintendent of the Detroit, Lansing and Northern Railroad, also addressed the board on the subject of a bridge.

The height of the proposed bridge was generally discussed, and the question asked why a down-grade to the bridge was desired, as the junction of the railroads meeting at Detroit was 25 feet above the river, while the height of the bridge suggested was only 15 feet; this question elicited the information that the object was to make use of the present yard of the Michigan Central Railroad.

The senior member of the board, with a desire for a compromise between the conflicting interests, asked what was the best the railroads could do for the commercial interests.

Mr. Ledyard declined to state over 20 feet as the maximum height for a bridge.

Mr. James F. Joy engaged in the general discussion of the traffic across the Detroit River.

Mr. Ledyard promised to present to the board a full statement in writing showing exactly what the railroads demand in reference to a bridge and what they can do to satisfy the demands of navigation.

Mr. G. V. N. Lothrop, referring to the height of the river, stated that, with an experience of a great many years, he had never seen a difference of level in Lake Saint Clair of over 3 feet.

Mr. James F. Joy, representing, as he stated, the public generally as well as the railway interests, addressed the board at length upon the subject of bridging the Detroit River.

Mr. G. W. Bissell, who represented the interests of navigation, engaged in an energetic discussion with Mr. Joy upon the question of the height of the bridge, the commerce of the river, &c. In reply to a question from a member of the board, Mr. Bissell stated that if it was absolutely determined to build a bridge it would make no difference to the vessel interests whether it was 15 or 40 feet high, except that tugs with a joint in their smoke-stacks could pass under the latter, and they could do the same under a bridge 30 feet high.

Mr. Luther Beecher, who stated that he represented "the real owners, tax-payers, and solid productive interests," presented a communication to the board protesting against a bridge, and favoring a tunnel upon a plan proposed by himself. The subject was discussed by the board, Mr. Beecher, Mr. Joy, Mr. Lothrop, and Mr. Muir.

Mr. W. S. Pope, civil engineer, at the request of the citizens' committee of Detroit, Mich., addressed the board on the subject of bridging the Detroit River. He was questioned by a member of the board concerning a proposed plan for obtaining a wider opening than usually obtained by a draw, by means of two draws operating upon center piers, so that when opened there would be a clear space of 400 feet. Mr. Pope explained the difficulties of counterpoising the ends that would swing in mid-channel, but regarded the plan as a good one provided it could be used for railroad purposes. Mr. Pope also explained his plan for utilizing a draw with an opening of only 160 feet by means of booms extending from piers 800 feet apart, 1,200 feet above the bridge, to the piers on each side of the draw. "The arrangement will make a converging, funnel-shaped approach to the draw, with an opening at the upper end, say 800 feet wide."

Mr. T. Romeyn presented a telegram from the Great Western Railroad, stating that the road had had no notice of the meeting of the Board of Engineers, and therefore had prepared no statistics.

Mr. W. K. Muir discussed the subject of the bridge and explained the disadvantages of having it below the city.

Mr. G. W. Bissell made some further statements before the board relative to the tonnage of passing vessels, and the number in each 24 hours during the season of navigation.

The senior member placed before the board a telegram from the Acting Chief of Engineers, authorizing the board to adjourn temporarily until statistics could be prepared for their information, and at 1 p. m. the board adjourned, subject to the call of the senior member.

NOVEMBER 18, 1879.

At the call of the senior member the board reassembled at Detroit, Mich.; at 11 o'clock a. m., all the members being present.

The senior member presented the following papers, which had been received by him since the last session of the board, which were read, viz:

A letter from his excellency the governor of Minnesota, transmitting a copy of a letter to the honorable Secretary of War protesting against the construction of a bridge across the Detroit River; a letter from the president of the Chamber of Commerce of Saint Paul, Minn.,

transmitting a resolution of that body protesting against the construction of a bridge at Detroit; communications from the inspectors of the 10th and 11th light-house districts, transmitting statistics in reference to the commerce of the lakes; a communication from the Secretary of the Cleveland, Ohio, Board of Trade, transmitting a copy of the resolutions of that board protesting against a bridge across the Detroit River.

Mr. William Scott, civil engineer of Detroit, addressed the board in reference to the passage of the Detroit River by means of a tunnel and of a bridge, and exhibited and explained his plans for both. Mr. Scott stated that he had been connected with the following public works:

Exeter and Great West Railroad, England; Eastern Union Railroad, England; Harbor of Refuge, Aldborough, England; division engineer Great West Railroad, Canada; Pointe Peleé light-house, Lake Erie; Detroit and Lansing Railroad, and Bay City Railroad.

Mr. J. P. Morris, of Detroit, exhibited a chart showing proposed line for a bridge across the river, and informed the board that the Michigan Central Railroad has now built, for the use of their business, exclusive of their two main tracks, $34\frac{1}{2}$ miles of side track between their depot at Third street, Detroit, and the Grand Trunk junction. It is valued at \$2 per linear foot.

Mr. James McMillan presented to the board the following papers, viz: A communication from R. A. Alger and others, of Detroit, favoring the construction of a bridge across the Detroit River.

A printed copy of the address of Mr. J. F. Joy to the Board of Engineers.

A communication from himself, as chairman of the citizens' committee of Detroit, in reference to the bridges over the Niagara and Saginaw Rivers in their bearing towards the proposed bridge over the Detroit River.

A delegation from the Cleveland Board of Trade appeared before the board and, through their chairman, asked to be heard. The delegation consisted of the following gentlemen: Mr. George H. Ely, Mr. R. K. Winslow, Capt. A. Bradley, Capt. W. B. Guyles, Capt. Thomas Wilson, and Mr. Mark Hanna.

Mr. Ely addressed the board at length in opposition to the construction of a bridge at Detroit. He was followed by all the other members of the delegation, all in opposition to a bridge.

Mr. Mark Hanna addressed the board, and gave valuable statistics in reference to vessels passing Detroit. He believed it to be a physical impossibility for vessels to go through the bridge and cars over it during the season of navigation, and thought the draw would have to be open or closed nearly all the time.

Capt. Thomas Wilson, a practical navigator, referred to the Saint Clair Flats Canal as far as it was an impediment to navigation.

Mr. R. K. Winslow informed the board that vessels that are now constructed will carry from 60,000 to 80,000 bushels of grain; he stated that the Richard Winslow was 214 feet long, 36 feet beam, with a depth of hold $14\frac{1}{8}$ feet; she has 4 masts; her mainmast 103 feet high; and she draws, when loaded, $14\frac{1}{2}$ feet. He stated further that it cost but little more to run a vessel of 60,000 bushels capacity than one of 20,000 bushels.

Capt. W. B. Guyles, as an agent of the insurance companies, gave as his opinion that the construction of a bridge would increase the rates of insurance 20 per cent.

At 1 p. m. the board adjourned to meet at 2 p. m.

NOVEMBER 18, 1879.

AFTERNOON SESSION.

The board reassembled at 2 p. m., all the members being present.

Mr. Chas. Kellogg, of Buffalo, a bridge builder, presented plans for a bridge with a draw-span of 650 feet, and two clear openings of 300 feet, which bridge, exclusive of approaches, he stated would cost about \$1,000,000, and could be opened in one minute. Mr. Kellogg entered into an elaborate description of his bridge, and answered numerous technical questions propounded by the different members of the board.

Mr. Luther Beecher, of Detroit, addressed the board against a bridge, and in favor of a tunnel, and exhibited and explained his plans for the latter; he stated that he believed a tunnel could be built at Twenty-fourth street for \$1,250,000, and at the Detroit and Milwaukee depot for \$1,800,000.

Mr. J. S. Diack, of Detroit, addressed the board, and presented and explained his plan for a tunnel and his proposed method of excavation.

At 4.30 p. m. the board adjourned until 9.30 a. m. on the 19th instant.

WEDNESDAY, *November 19, 1879.*

The board met at 9.30 a. m. Present, all the members.

The various papers which had been presented on the 18th instant by Mr. McMillan were read, and the board entered into a general discussion of the subject before them.

At 10.30 a. m. Mr. J. W. Burt, representing the Marquette Iron Association, addressed the board, protesting most earnestly against the construction of a bridge across the Detroit River; he stated that the association had shipped during the past season 1,400,000 tons of iron ore from Marquette; he dwelt on the fact that this company should be listened to most attentively, and that their opinion should carry great weight, as, during the civil war, they had furnished, to use his own language, "the sinews of the war"; their iron having been sent to Pittsburgh and cast into heavy guns. Mr. Burt in his individual capacity urged the favorable consideration of the subject of a tunnel, and presented his plans for the examination of the board. In answer to a question from a member of the board he stated that if a tunnel could not be built, then a bridge should by all means be constructed.

Mr. J. L. Stackpole, of Boston, Mass., representing the Marquette, Houghton and Ontonagon Railroad Company, addressed the board, protesting earnestly against the construction of a bridge.

General P. T. Tumley, of Chicago, addressed the board, claiming that a tunnel under the Detroit River was impracticable, and that a bridge could be built across it without detriment to navigation, and that a draw-span of 600 feet was entirely practicable.

Mr. J. W. Thompson, representing the marine interests of Port Huron, appeared before the board and protested against the construction of a bridge across the Detroit River; he gave statistics of tunneling, and claimed that a tunnel under the river was perfectly practicable. General P. T. Tumley stated that he was not opposed to a tunnel, but rather favored it; that his information as to its being impracticable was obtained from those engaged upon the preliminary tunnel at Detroit.

Mr. T. H. Hinchman, president of the merchants' and manufacturers' exchange of Detroit, addressed the board in favor of a bridge across the Detroit River.

The junior member of the board, by its direction, addressed a letter to Mr. H. B. Ledgard, asking that he would furnish the data which he

promised on the 18th ult., in reference to exactly what the railroads demand in reference to bridging the Detroit River.

Mr. J. S. Diack presented a description of a tunneling machine. At 12.30 p. m. the board adjourned to meet at 2.30 p. m.

NOVEMBER 19, 1879.

AFTERNOON SESSION.

The board met at 2.30 p. m., all the members being present.

Mr. G. W. Bissell presented a letter from Mr. W. D. Ashley in reference to bridges in the Saginaw Valley, which was read.

Mr. Thompson, of Port Huron, addressed the board, showing the interest of Minnesota in keeping the Detroit River free from obstructions of any kind.

The board at 3 p. m., having heard all parties who had expressed a desire to appear before them, took up for final discussion and deliberation the subject submitted for their consideration.

At 5 p. m. the board adjourned to meet to 9.30 a. m. on the 20th inst.

THURSDAY, November 20, 1879.

The board met at 9.30 a. m., all the members being present, and engaged in the general discussion of the subjects of the tunnel and the bridge, and in the examination of the data submitted.

At 12.30 p. m. the board adjourned until 2.30 p. m.

NOVEMBER 20, 1879.

AFTERNOON SESSION.

At 2.30 p. m. the board met, all the members being present, and continued the discussion of the subject before them.

At 5 p. m. the board adjourned until 9.30 a. m. on the 21st inst.

FRIDAY, November 21, 1879.

The board met at 9.30 a. m., all the members being present.

The senior member laid before the board resolutions of the Buffalo Board of Trade, protesting against a bridge across the Detroit River.

The board continued the discussion of the subjects before them, and having arrived at their final conclusions, as will be found in their report, at 1 p. m. adjourned *sine die*.

W. F. RAYNOLDS,

Lieut. Col. of Engineers, Bvt. Brig. Gen.,
Senior Member of the Board.

JOHN M. WILSON,

Major Engineers, Bvt. Col. U. S. A.,
Junior Member and Recorder of Board.

